



Grade 8 Science

Unit 3: Fluids

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The Particle Theory of Matter

?

1

All matter is made up of particles

2

All particles in a pure substance are identical (no two different pure substances have the same particles)

3

All particles have space between them

4

All particles are always moving – more energy (heat) produces more movement

5

All particles are attracted to one another



Volume

Last week we did two experiments, in which we were able to compare the difference in compressibility of liquids and gases. What did we learn by doing those experiments?

- > Gases are highly compressible - a large quantity of gas can be compressed into a small volume.
- > Liquids are not compressible - even with a large force, a liquid does not noticeably change volume.
- > Gases are also able to expand - even a small amount of gas can spread out and fill a large volume.
- > Liquids will not expand - even with a large force, a liquid does not noticeably change volume.



Pressure

Last week we did an experiment in which we were able to compare the difference in pressure exerted by liquids and gases. What did we learn by doing that experiment?

- > Both gases and liquids are able to use fluid pressure to transmit a force.
- > A liquid transmits a force quickly, and without delay - when you suppress a piston in a syringe, the syringe on the opposite end of the system will move right away.
- > A gas appears to have a delay in the transmission of a force - when you suppress a piston in a syringe, the syringe on the opposite end of the system does not move right away.



Temperature

Although it is not something that we have looked at this year, we are masters of the particle theory. What is the difference, as a result of temperature, between gases and liquids?

- > Gases have particles that move very rapidly - this is a result of a high level of energy.
- > Liquids have particles that are free to move around, but do so at a speed that is less than the speed in gases - this is a result of being at a lower energy state.
- > Gases have particles that are spread out - because they have more energy (due to temperature) they move further away from each other.
- > Liquids have particles that are relatively close together, yet are still free to move around - this is because they do not have enough energy to break completely free of each other.



Pressure, Volume and Temperature

The three values, pressure, volume, and temperature, all have an affect on one another. To discuss these affects, you will be put into small groups, to complete the following:

- I will present you with a situation
- You discuss this concept in your group
- You will document an answer

Once that is complete, we will form new groups, and repeat.

The goal of this exercise is to use previous knowledge to rationalize a new concept. By using what we know, we can make reasonable predictions about what would happen in a new situation.

Be sure to reference the theories/laws that we have learned.

Pressure, Volume and Temperature

1. If a gas is placed in a closed container, and the size of the container is reduced, what happens to the pressure? Why?



2. In situation #1, would there be a difference if the fluid was a liquid? Explain?



Pressure, Volume and Temperature

3. If a gas is placed in a closed container, and the temperature is increased, what happens to the pressure? Why?



4. In situation #3, would there be a difference if the fluid was a liquid? Explain?





Pressure, Volume and Temperature

To summarize the information we have covered:

1. An increase in temperature will cause an increase in pressure
2. A decrease in volume will cause an increase in pressure
3. The opposite of both above is also true.

We will not be experimenting with these concepts. However, for your test, you will need to know the relationship amongst pressure, temperature and volume, and be able to explain why that relationship exists.

You may use any remaining time to practise your hydraulics/pneumatics presentation.